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ABSTRACT

The gap in academic achievement between blacks and whites is one of the most serious problems in education today. Recent evidence suggests that this gap may be reduced without impairing the performance of whites if students are allowed to work in cooperative learning teams, as team techniques have been shown to increase academic achievement more for minority students than for anglos. This study tests findings with a student team technique called STAD, for Student Teams-Achievement Divisions. STAD is a generic learning technique capable of being used for any subject area in which objective tests can be given. Its most important feature is student teams, which are composed of four to five students of different past achievement. Each team is a cross-section of the class in terms of sex and race as well as academic achievement. The teams are given worksheets to study in pairs or as a group through peer tutoring. Students are tested on the material studied in the teams twice each week, and the individuals' scores are contributed to their team scores. However, the scores are first transformed to remove the effect of past achievement on present performance. Team success is rewarded by means of a weekly class newsletter. The subjects of the study were 65 seventh grade students in two English classes in a Baltimore junior high school. Results indicate that STAD does increase achievement dramatically for blacks, but only minimally for whites. Implications for education are discussed. (Author/JM)

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# STUDENT TEAM LEARNING TECHNIQUES: NARROWING THE ACHIEVEMENT GAP BETWEEN THE RACES

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## Introductory Statement

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through three programs to achieve its objectives. The Schools and Maturity program is studying the effects of school, family, and peer group experiences on the development of attitudes consistent with psychosocial maturity. The objectives are to formulate, assess, and research important educational goals other than traditional academic achievement. The program has developed the Psychosocial Maturity (PSM) Inventory for the assessment of adolescent social, individual, and interpersonal adequacy. The School Organization program is currently concerned with authority-control structures, task structures, reward systems, and peer group processes in schools. It has produced a large-scale study of the effects of open schools, has developed the Teams-Games-Tournament (TGT) instructional process for teaching various subjects in elementary and secondary schools, and has produced a computerized system for school-wide attendance monitoring. The School Process and Career Development program is studying transitions from high school to post secondary institutions and the role of schooling in the development of career plans and the actualization of labor market outcomes.

This report, prepared by the School Organization Program, examines differences in minority group and white achievement in classrooms using cooperative learning teams.

Abstract

The gap in academic achievement between blacks and whites is one of the most serious problems in education today. Recent evidence suggests that this gap may be reduced without impairing the performance of whites if students are allowed to work in cooperative learning teams, as team techniques have been shown to increase academic achievement more for minority students than for anglos. This study tests these findings with a student team technique called STAD, for Student Teams-Achievement Divisions. Results indicate that compared to control, STAD does increase achievement dramatically for blacks, but only minimally for whites. Implications for education are discussed.

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One of the most distressing problems in education today is the achievement gap between white and minority children. Coleman et al (1966) found that black achievement scores lagged approximately one standard deviation behind white scores throughout school, a difference that grows to approximately three grade levels by high school graduation.

This achievement gap has been variously explained, but attempts to reduce it have been largely unsuccessful. Early intervention programs such as Head Start have increased the performance level of black students as they enter first grade, but by third or fourth grade these benefits have disappeared (Bronfenbrenner, 1974). The Sesame Street program was designed to provide minority children with an enrichment experience like that presumed to be given to middle class white children, but the program increased academic achievement in all children, actually increasing the black-white achievement gap (Ball and Bogatz, 1973). School desegregation has also been seen as a way to reduce the black-white achievement gap, but it too has been largely ineffective in doing so (St. John, 1975). Given the disappointing results of these major efforts, it is tempting to give up the search for a means of reducing black-white achievement differences and wait for increased economic opportunity, decreased discrimination, changing attitudes, or some other socioeconomic change to take care of the problem.

However, a recent study by Lucker, Rosenfield, Sikes, and Aronson (1976) reports a finding that reopens the possibility of reducing the minority-white achievement gap without reducing the achievement of white students. They found that an interdependent (student team) classroom technique, the "jigsaw method," was more effective than a control

technique in increasing the academic achievement of minority students (a combined group of blacks and Mexican-Americans), but no more effective than control in increasing the academic achievement of anglo students.

The present paper reports the results of a study in which a different student team learning technique was used in an integrated setting. This technique, which is called STAD (for Student-Teams-Achievement Divisions), resembles the "jigsaw method" in that it places students on small, racially mixed learning teams in which students study academic material. However, it is different in scope and in specific procedures.

Student-Teams-Achievement Divisions. STAD is a generic learning technique capable of being used for any subject area in which objective tests can be given. Its most important feature is student teams, which are composed of 4-5 students of different past achievement. Each team is (as closely as possible) a cross-section of the class in terms of sex and race as well as academic achievement. The teams are given worksheets to study in pairs or as a group through peer tutoring. Students are tested on the material studied in the teams twice each week, and the individuals' scores are contributed to their team scores. However, the scores are first transformed to remove the effect of past achievement on present performance. This transformation is done by means of the "achievement divisions" (see Slavin, 1977a, for a more complete description). The transformation attempts to equalize the chance that each student, regardless of past performance, may contribute the maximum number of points to his or her team if he or she performs well. Team success is rewarded by means of a weekly class newsletter, which emphasizes team

scores but also mentions individuals who have contributed substantially to their team scores.

Thus, STAD is like the "jigsaw method" in that it contains a cooperative reward structure (the teams) and a cooperative task structure (tne peer tutoring). However, the STAD treatment is designed for use over periods of time of at least eight weeks, while the jigsaw method was used for two. Further, STAD is a system that is easy to implement and is widely applicable.

## Method

Subjects and Design. The subjects were sixty-five seventh grade students in two English classes in a Baltimore junior high school. The intact classes were assigned (by coin flip) to an experimental (STAD) and a control condition. There were 34 students in the experimental class (M=19, F=15; W=16, B=18), and 31 students in the control class (M=17, F=14; W=9, B=22). The school as a whole had a black enrollment of about 70 percent.

The study employed a simple experimental-control group design, with pretests given on all measures for use as covariates to control for initial differences. Both classes were taught by the same black female teacher.

Treatments. The STAD treatment was implemented for forty minutes a day for a total of nine weeks in the spring term. The control class studied the same worksheets, took the same tests, and followed exactly the same schedule as that followed in the STAD class. The only difference is that the control class did not work in teams or receive a newsletter.

Both classes studied a language mechanics unit (capitalization, punctuation, parts of speech, etc.) developed by the experimenter. The schedule followed in both classes involved two 100-minute (2-1/2 period) cycles per week in which the teacher presented material by means of a 40-minute lecture, students worked on worksheets for 40 minutes (in teams if experimental, individually if control), and students were individually quizzed (20 minutes).

Measures. Students were pre- and posttested on parallel forms of a standardized language arts test (the Hoyum-Sanders Junior High School English Test), and on roughly equivalent forms of a treatment-specific test which contained actual worksheet items. In addition, the sum of the twice-weekly quiz scores obtained by each student in the last three weeks of the program was used as an academic achievement measure (controlling for treatment-specific pretests). Attitudinal and sociometric variables were also measured, but these results are presented elsewhere (see Slavin, 1977b).

## Results

The results were analyzed separately by race. An analysis of covaeiance was performed on all three variables using a multiple regression model in which the incremental $R^2$ due to treatment was tested for statistical significance. Because of a low correlation between Hoyum-Sanders pretest and posttest (due to a small number of extreme values), the treatment-specific pretest was used as the control for initial ability for all analyses.

The results shown in Table 1 strongly support the assertion that student-team learning techniques increase academic achievement for blacks more than for whites. Blacks in the STAD class made significantly greater gains than did blacks in the control class on the standardized Hoyum-Sanders Test ($R^2_{inc}$ = .334 $F(1,33)$= 53.92; $p < .001$). The same treatment effects were found for the treatment-specific test ($R^2_{inc}$ = .122; $F(1,33)$ = 11.70; $p < .01$) and the twice weekly quiz scores ($R^2_{inc}$ = .224; $F(1,33)$ = 16.29; $p < .001$). On the other hand, no treatment effects were found for whites on the same three measures, although the trends on all three are in favor of the STAD students. It is possible that the lack of significant findings among the whites is due to the small number of whites in the control group for whom complete data were available. However, even if there would have been significant STAD effects for whites (had there been more whites), these effects would hardly have approached the level of difference found between the black students in the experimental and control groups. The race-treatment interaction is significant for all three dependent measures, the Hoyum Sanders ($R^2_{inc}$= .142; $F(1,61)$ = 31.64; $p < .001$), the treatment-specific test ($R^2_{inc}$= .041; $F(1,61)$ = 6.89; $p < .05$) and the quiz scores ($R^2_{inc}$= .038; $F(1,61)$ = 4.00; $p < .05$).

Discussion

Several explanations could account for the more positive effects of a student team intervention on blacks than on whites. One is that the present findings and those of the Lucker et al study are artifacts that will disappear when larger studies conducted over a greater time period

Table 1

Effects of STAD Treatment on Three Measures of Academic Achievement

| | Blacks | Whites | Race x Treatment Interaction |
|---|---|---|---|
| Hoyum-Sanders | df=1,33 | df=1,21 | df=1,61 |
| $R^2$ | .769 | .336 | .727 |
| $R^2_{inc}$ | .334 | .078 | .142 |
| F | 53.92 | 2.47 | 31.64*** |
| Treatment-Specific Test | | | |
| $R^2$ | .656 | .358 | .642 |
| $R^2_{inc}$ | .122 | .007 | .041 |
| F | 11.70** | <1 | 6.89* |
| Quiz Scores | | | |
| $R^2$ | .546 | .122 | .421 |
| $R^2_{inc}$ | .224 | .001 | .038 |
| F | 16.29*** | <1 | 4.00* |

*p < .05

**p < .01

***p < .001

are conducted. A study of this kind which will involve 6-8 teachers and 12-18 classes is currently being planned by the author of this paper. However, given that the effects are real and replicable, what causes them?

One explanation is suggested by Spilerman (1971), who proposed using student teams to solve some of the learning problems of lower class children. He notes that lower class and minority children and adolescents are much more peer oriented than are their middle class counterparts, therefore the competitive nature of the traditional classroom may conflict with their cooperative peer culture.

This explanation is supported by Madsen and Shapiro (1970), who found that given a choice, white children are more likely than blacks to compete rather than cooperate. Slogget (1971) found that a group of native Hawaiians were so peer oriented that the traditional, competitive reward structure of the classroom was ineffective with them--they refused to excel for fear of making their peers look bad. She used a cooperative system with these students that was very effective in increasing their academic achievement. Unfortunately, we do not know enough about peer-orientation among blacks; however, if blacks, as a minority group, are peer-oriented in a similar way to other minority groups (Mexican-Americans [Nelson and Kagan, 1972] or Hawaiians), this could be a major explanation for the results reported by Lucker et al and those reported here.

Another explanation is that there is an ability by treatment interaction instead of a race by treatment interaction. In this study, the pretest scores of black students were well below those of whites (the correlation between race and pretest is .43). It is plausible that a

treatment that emphasized the importance of each student's contribution to his or her team score would have especially dramatic effects for the low performers, who have little chance of being rewarded in the traditional class. An analysis of pretest x treatment interaction effects controlling for race was conducted to determine whether this is a major explanation of the race x treatment interaction. One of the measures, the Hoyum-Sanders, showed a treatment x pretest effect ($R^2_{inc} = .036$; $F(1,61) = 5.74$, $p < .05$), indicating the possibility that a pretest x treatment interaction is partly responsible for the race x treatment interaction.

This study raises many questions. If the results withstand replication, educational policy makers will be presented with an educational alternative for reducing black-white achievement differences without decreasing the achievement of whites. Using a technique that accomplishes this has major political implications. In addition, what would this result say about the origin of black-white achievement differences and the cultural factors involved in these differences? This study explores the tip of an iceberg whose base may contain a new way of looking at black and white differences in academic achievement.

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